The Present Taxo-Serological Works in the Field of Herpetology at the Instituto Biologia Animal Cuyo University, Mendoza, Argentina

J. M. Cei

Since several years ago the precipitin immunological tests are utilized as a routine technique in the herpetological works of the Institute of Animal Biology, the Cuyo University, Mendoza, Argentina. The fitness of the method enables it to contribute very effectively to the solution of, or the adequate approach to, a number of phyletic or taxo-genetic problems, which are difficult to solve by the accessible morphological evidence alone. The discriminating significance of the whole antigenic systems of the sera by means of the immunological comparisons indicate the progressive levels of the genetic and taxonomic relationships, such as at the subspecific or generic levels. It would be difficult, of course, to establish a rigid yardstick measuring in numerical terms both the phyletic (or genetic) and serological distances. But the repeated quantitative expression of the homo-heterologous precipitin reactions may provide a true biologically objective kind of evidence which is probably more natural than most of the diagnostic characters currently used in taxonomy. I wish to enumerate here a number of works being carried out at this time in our Laboratory, utilizing the Libby's Photronreflectometric technique. They deal with different groups of Sauria and Anura, both from the Neotropical and Palearctic biotas.

The genus *Liolaemus*, is a stock of Iguanid lizards spreading on South-American territories from the highlands of Peru to the Magellanian channel. It is related with *Proctotretus*, *Vilcunia*, *Pelusaurus* and *Ctenoblepharis* and it includes several evolutive, often puzzling, species groups. Serological researches were performed in 1974 for a better elucidation of the interspecific relationships between *Liolaemus goetschi* from Rio Negro and Neuquén (High Patagonia) and the related forms *L. boulengeri* and *L. darwini*. They are small-sized lizards from the stepparian environments; their males are well recognizable, but the female specimens appear quite indistinguishable, above all the *goetschi-boulengeri* individuals. Precipitin tests showed the high genetic affinity between *goetschi* and *boulengeri*, the serological distance increasing between *goetschi* and *darwini*, much more between *darwini* and *boulengeri*. The agreement is so complete between the immunological and morphological kinds of evidence: *goetschi* and *boulengeri* represent a very recent step of physiological speciation, both the lizards being more divergent phyletically from *darwini*, whose females are easily recognizable from the females *boulengeri-goetschi*. Moreover the close serological relationship of the different *goetschi* populations from Rio Negro and Neuquén can be stressed, in spite of the remarkable individual variation of the species.

A similar problem was analyzed in *Liolaemus elongatus* and *L. austromendocinus*; lizards from the volcanic rocks of the Payún, south of Mendoza, Argentina and from the neighboring eastern cordilleran slopes of the Andean Mountains. Both the animals are morphologically very alike, almost cryptic species, but their physiological isolation is clear cut, as well as their serological distance (Cei, 1974; Bottari, 1975). Several tests were carried out between very separated populations both of *elongatus* and *austromendocinus* forms with an unquestionable homogeneity of results. The *elongatus* populations gave inter-se very high percents of homo-heterologous reactions. The several tested populations of *austromendocinus*, geographically very distant in some cases, react in the same way. Moreover both species lie at a significant but stronger serological distance from another similar and sympatric species of the group, *Liolaemus buergeri*.

A third problem concerned with neotropical Iguanids was studied in the genus *Cupriguanus*, also a stout lizard from the Andean and Patagonian plateau. The characters separating the cordilleran *Cupriguanus scapulatus* from the extracordilleran form *Cupriguanus fasciatus*, are very faint. Under a careful morphological comparison both the allopatric species could be questionable. However a significant number of serological tests supports their actual status of good specific taxa. Both species lie at a greater serological distance from *Cupriguanus achalensis*, another isolated representative of the genus from the pampean massif, Sierras Grandes de Cordoba. An even more noticeable serological distance was observed from *Leiosaurus* and *Diplolaemus*, austral genera of the same phylogenetic branches. Then, in the case of *Cupriguanus* taxonomy, the serological kind of evidence sounds like a more effective diagnostic criterion than the morphological characters hitherto used.

Several other researches were developed by us on Reptiles. The serological relationships between the allo-sympatric *Diplolaemus darwini* and *Diplolaemus bibroni* have been studied; the subspecific status of a new isolated form of *Phymaturus* (*P. patagonicus nevadoi*: Cei and Castro, 1974; Cei and Roig, 1975) has been analyzed and confirmed; the subspecific relationships of the *Liolaemus fitzingeri* complex were investigated (Cei, 1975). A revision of the serological relationships between the European lacertilids *Archaeolacerta*, *Lacerta* and *Podarcis* (Arnold, 1973) is now projected and a noticeable number of samples from Mediterranean and Iberian peninsulas has been as yet assembled and prepared, in cooperation with European herpetological centers.

Three fundamental works being carried out on Batrachians at present by the photronreflectometric tests. They concern: the specific-subspecific relationships in the *Discoglossus pictus-sardus* complex; the eventual agreement between the *Rana esculenta-lessonae-ridibunda* European frogs, in accordance with the recent hypothesis by Berger (1973) on the hybrid nature of the classical green frog (*R. esculenta*) in Poland; the serological variation of the *Bufo bufo* Eurasiatic populational complex. The first approach to this latter (Cei, 1973) gave the puzzling result of a true interspecific distance between samples, from Central Europe and Iberian peninsula, of such a classic taxon, as the common toad. Our former intriguing results are now under extensive careful revision with samples ranging from Japan to Portugal. The peculiar taxo-serological features of the problem are greatly different from the agreement usually found between the serological relationships and the taxonomic status of the several *Bufo* groups formerly analyzed by us: the *Bufo arenarum* complex and the *Bufo spinulosus* super-species from South America, the *Bufo mauritanicus* complex (Siboulet, 1972) or the *Bufo regularis* group from Africa.

This general report on the present taxo-serological activity in Mendoza supports with its array of data the great usefulness of the above mentioned method for the herpetological studies. Since the pioneer works by Boyden and collaborators in the '30–'40 decades, the performance of the photronreflectometric technique has been very much improved. It remains perfectly comparable for its preciseness and reproducibleness to the more recent techniques such as the MC'F (Microcomplement fixation: Salthe and Kaplan, 1966) and others.

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A Note from Cambridge University

At the University Museum of Zoology in Cambridge we established a small sero-taxonomy unit some four years ago. Dr. K. A. Joysey, the director of the Museum, had followed the work by Dr. J. A. W. Kirsch on marsupials and was excited by the prospect of examining members of the order Insectivora by similar methods. Insectivores are, of course, a notoriously problematical group as far as their evolutionary history is concerned: at various times separate orders have been suggested for many of the families included under the classical scheme. In fact, it is clear that many of the insectivore groups have been separate from one another for long periods of time.

The order Insectivora serves as a 'waste-basket' for small, relatively unspecialised placental mammals of uncertain affinity. Both fossil and living forms are included in large variety and the consequent use of tooth characters in the morphological work has ensured that there are almost as many opinions as there are investigators.

We hope that the serological work in Cambridge will at least suggest new lines of approach to some of the groups. It would be rash to look forward to solving the many problems at one sweep, and indeed, the first results of the immuno-taxonomic comparisons seem to be as fearsomely difficult to interpret as the morphological data.

As sero-taxonomists will be aware the phylogenetic relationships of the Lagomorpha are also uncertain, although new fossils and ideas are currently being reported from America. The use of the rabbit to produce antiserum to insectivores calls, therefore, for some careful examination. There is every chance that lagomorphs—probably a relatively early differentiated offshoot of placental mammals—will not be impartial in their sero-taxonomic perspective. Certainly the use of chickens provides a useful comparison here.

At Cambridge we have also undertaken comparative work on the primary sequence of myoglobin and it has been possible to include two insectivores (tree-shrew and hedgehog) amongst the twenty-eight mammals of this study. We believe that this is the first time that sequence information has been available for any protein from these animals. It is of interest that the tree-shrew (we used, in fact, *Tupaia glis*) seems to be unique amongst the mammals examined so far in having changed remarkably little in its myoglobin from a reconstructed ancestral placental sequence.

Both sets of work should be completed by late 1975 and the conclusions will be reported in this Bulletin.

It is to be hoped that immuno-taxonomic and sequence studies on the mammalian 'poor relations'—those difficult and seemingly isolated orders which have so far defied analysis—will increase now that much confidence in the methods has been generated by studies within orders, especially Primates. Of course, it is not easy to collect serum samples from small mammals spread thinly over the world, and this has been one of our major problems, quantities are small and taxonomic coverage is not as good as we should like, so that the more people working on these animals the merrier will be the discussion concerning interpretation of results.

Adrian Friday